

2011
7.6 HW

13. $p(x) = x^3 + 8x + 6$

$p \in \{\pm 1, \pm 2, \pm 3, \pm 6\}$

$q \in \{\pm 1\}$

$\frac{p}{q} \in \{\pm 1, \pm 2, \pm 3, \pm 6\}$

15. $p(x) = x^5 + 6x^3 - 12x + 18$

$p \in \{\pm 1, \pm 2, \pm 3, \pm 6, \pm 9, \pm 18\}$

$q \in \{\pm 1\}$

$\frac{p}{q} \in \{\pm 1, \pm 2, \pm 3, \pm 6, \pm 9, \pm 18\}$

19. $p(x) = x^3 - 3x - 2$

$p \in \{\pm 1, \pm 2\}$
 $q \in \{\pm 1\}$

$$\begin{array}{r|rrrr} -1 & 1 & 0 & -3 & -2 \\ & & -1 & 1 & 2 \\ \hline & 1 & -1 & -2 & 0 \end{array}$$

$x^2 - x - 2$

$(x-2)(x+1)$

$\{-1, 2, -1\}$

25.

$p(x) = x^4 + 10x^3 + 33x^2 + 38x + 8$

$p \in \{\pm 1, \pm 2, \pm 4, \pm 8\}$

$q \in \{\pm 1\}$

$\frac{p}{q} \in \{\pm 1, \pm 2, \pm 4, \pm 8\}$

$$\begin{array}{r|rrrrr} -2 & 1 & 10 & 33 & 38 & 8 \\ & & -2 & -16 & -34 & -8 \\ \hline & 1 & 8 & 17 & 4 & 0 \\ -4 & & & -4 & -16 & -4 \\ \hline & 1 & 4 & 1 & 0 & 0 \end{array}$$

$x^2 + 4x + 1$

$\frac{-4 \pm \sqrt{16 - 4(1)(1)}}{2} = \frac{-4 \pm 2\sqrt{3}}{2}$

Rational answers

$\{-2, -4, -2 \pm \sqrt{3}\}$

$-2 \pm \sqrt{3}$

$$28. h(x) = 10x^3 - 17x^2 - 7x + 2$$

$$p \in \{\pm 1, \pm 2\}$$

$$q \in \{\pm 1, \pm 2, \pm 5, \pm 10\}$$

$$\frac{p}{q} \in \left\{ \pm 1, \pm \frac{1}{2}, \pm \frac{1}{5}, \pm \frac{1}{10}, \pm 2, \pm \frac{2}{5} \right\}$$

$$\begin{array}{r|rrrr} -\frac{1}{2} & 10 & -17 & -7 & 2 \\ & & -5 & 11 & -2 \\ \hline & 10 & -22 & 4 & 0 \end{array}$$

$$10x^2 - 22x + 4 = 0$$

$$5x^2 - 11x + 2 = 0$$

$$5x^2 - 10x - x + 2$$

$$5x(x-2) - 1(x-2)$$

$$(5x-1)(x-2) = 0$$

$$x = \frac{1}{5} \quad x = 2$$

$$\left\{ \frac{1}{5}, 2, -\frac{1}{2} \right\}$$

$$30. p(x) = 6x^4 + 22x^3 + 11x^2 - 38x - 40$$

$$p \in \{\pm 1, \pm 2, \pm 4, \pm 5, \pm 8, \pm 10, \pm 20, \pm 40\}$$

$$q \in \{\pm 1, \pm 2, \pm 3, \pm 6\}$$

$$\frac{p}{q} \in \left\{ \pm 1, \pm \frac{1}{2}, \pm \frac{1}{3}, \pm \frac{1}{6}, \pm 2, \pm \frac{2}{3}, \pm 4, \pm \frac{4}{3}, \pm 5, \pm \frac{5}{2}, \pm \frac{5}{3}, \pm \frac{5}{6}, \right. \\ \left. \pm 8, \pm \frac{8}{3}, \pm 10, \pm \frac{10}{3}, \pm 20, \pm \frac{20}{3}, \pm 40, \pm \frac{40}{3} \right\}$$

$$\begin{array}{r|rrrrr} -2 & 6 & 22 & 11 & -38 & -40 \\ & & -12 & -20 & 18 & 40 \\ \hline & 6 & 10 & -9 & -20 & 0 \\ & & 8 & 24 & 20 & \\ \hline & 6 & 18 & 15 & 0 & \end{array}$$

$$6x^2 + 18x + 15 = 0$$

$$2x^2 + 6x + 5 = 0$$

$$-6 \pm \sqrt{36 - 4(2)(5)} \quad -6 \pm 2i$$

$$\left\{ -2, \frac{4}{3}, -\frac{3 \pm i}{2} \right\}$$